

Application of Reinforced HTS 2212 Wires in ADR Magnets Operating at 30K-40K, Phase I

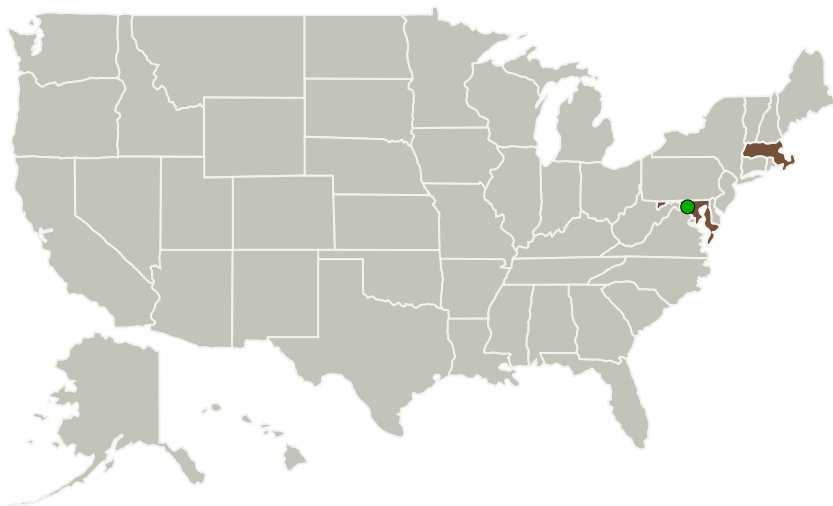
Completed Technology Project (2010 - 2010)



Project Introduction

Adiabatic Demagnetization Refrigerators (ADRs) are considered for operations in many space missions. At the heart of an ADR is a magnet that produces the background field necessary for demagnetization of a paramagnetic material. To achieve very low temperatures, all sources of heat need to be eliminated or minimized, making superconducting magnets an obvious choice. The size and power requirement of current cryocoolers that cool such superconducting magnets to about 4K make them unrealistic for space missions. ADR magnets that can operate at 30K-40K require simpler cooling systems and are more suited to space applications. This requires the coils to be fabricated from HTS wires. Phase I of this work aims to manufacture 0.2mm diameter Bi2212/Ag wires and fabricate a 1T 30mm dia. x 62mm long superconducting coil that can operate at 30-40K. Since 2002 our company has been the beneficiary of SBIR awards in the area of developing light-weight low-current ADR magnets operating at 10K by using Nb3Sn superconducting wires in manufacturing of ADR magnets, and successfully fabricated demonstration magnets that were provided to NASA Goddard Space Flight Center. All the developed techniques, procedures and the equipment will directly be applied to the aims of this proposal.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Superconducting Systems, Inc.	Lead Organization	Industry	Billerica, Massachusetts
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Massachusetts

Project Transitions

**January 2010:** Project Start**July 2010:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140565>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Superconducting Systems, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

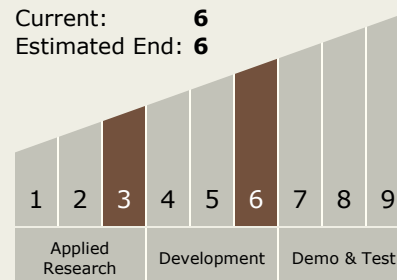
Carlos Torrez

Principal Investigator:

Shahin - Pourrahipi

Technology Maturity (TRL)

Start: 3
 Current: 6
 Estimated End: 6



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Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.1 Cryogenic Systems
 - └ TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System